

Agrostis meyenii Trin. (Poaceae, Agrostidinae): first records from Peru, including taxonomic notes and an identification key

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Abstract

The grass *Agrostis meyenii* Trin. (Poaceae, Agrostidinae) is newly recorded from Peru and is found in high-Andean puna grasslands of the departments of Ancash, Ayacucho, and Huánuco, marking the northernmost known limit of this species. A revised species description, images, taxonomic notes, and a key are also presented to differentiate *A. meyenii* from similar species in Peru with congested, spike-like panicles and absent or reduced (measuring less than ½ the length of the lemma) paleas (i.e., *A. breviculmis* Hitchc., *A. foliata* Hook.f., and *A. toluensis* Kunth).

Keywords

Andes, Gramineae, grass, identification key, puna grassland, taxonomy

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Introduction

The grass genus *Agrostis* L. belongs to tribe Poeae R.Br., subtribe Agrostidinae Fr. (Soreng et al. 2017) and is morphologically defined by taxa with membranous ligules, paniculate inflorescences composed of one-flowered, laterally compressed spikelets, glumes usually amply surpassing the florets, florets lacking a rachilla extension emerging from under the palea, and calluses glabrous or short pilose, among other characteristics. The taxonomy of *Agrostis* is continuing to undergo upheaval as more molecular and morphological data becomes available and, while traditionally considered to contain many genera (e.g. *Podagrostis* (Griseb.) Scribn. & Merr., *Lachnagrostis* Trin.) (Clayton and Renvoize 1986; Watson and Dallwitz 1992) many of these have since been considered distinct (e.g. Soreng et al. 2017; Sylvester et al. 2020a).

Within Peru, besides species protologues, the only taxonomic treatment available on *Agrostis* is the country-wide treatment of the grasses of Peru by Tovar (1993), who cited 15 species. Oscar Tovar Serpa also helped with the checklist for Peru, published in the same year (Davidse et al. 1993), that confusingly cites 18 species, including many, but not all, of those from Tovar's (1993) treatment, with some of these being placed in synonymy and other species of *Bromidium* Nees & Meyen being considered under *Agrostis* (e.g. *Bromidium anomalum* (Trin.) Döll, *B. tandilense* (Kuntze) Rúgolo), as well as *A. magellanica* Lam., and *A. nigritella* Pilg. (= *A. foliata* Hook.f.). Davidse et al.'s (1993) checklist is also replicated in the W3TROPICOS-Peru Checklist (2020), although many of the names have since been placed in synonymy

or transferred to other genera (Soreng et al. 2003, 2003 and onwards; Sylvester et al. 2020a). Despite ca 27 years since the publication of the aforementioned checklist and taxonomic treatment (Davidse et al. 1993; Tovar 1993), no new records or discoveries of new species of *Agrostis* have been made for Peru until now. During herbarium research at the United States National Herbarium (US), specimens of *Agrostis meyenii* Trin., a species recorded further south in Bolivia, Argentina, and Chile (Renvoize 1998; Rúgolo de Agrasar 2012; Jørgensen et al. 2014), were encountered and mark the northernmost distribution of this species recorded to date. With the addition of *A. meyenii*, and including taxa previously circumscribed in *Bromidium* based on indications from recent phylogenetic research (Tkach et al. 2020), it is currently estimated that 13 species of *Agrostis* are present in Peru (*A. breviculmis* Hitchc.; *A. foliata* Hook.f.; *A. gigantea* Roth; *A. hyemalis* (Walter) Britton, Sterns & Poggenb.; *A. imberbis* Phil.; *A. koelerioides* É.Desv.; *A. mertensii* Trin.; *A. meyenii*; *A. perennans* (Walter) Tuck.; *A. stolonifera* L.; *A. subrepens* (Hitchc.) Hitchc.; *A. tandilensis* (Kuntze) Parodi; *A. toluensis* Kunth) (Davidse et al. 1993; Tovar 1993; Soreng et al. 2003 and onwards; Plants of the World Online 2020; Sylvester et al. 2020a). However, a taxonomic reappraisal of Peruvian *Agrostis* is urgently needed, with our research contributing to this.

Methods

Accepted species follow Soreng et al. (2003 and onwards). Herbarium acronyms follow Thiers (2020). The US herbarium was visited during the study. The identity of the *A. meyenii* voucher specimens for Peru was verified by morphological comparison with type specimens at the US herbarium and on JSTOR Global Plants (<https://plants.jstor.org/>) and other specimens collected from Argentina and Chile, while ascertaining that morphological characteristics coincide with those stated in type protologues and taxonomic literature (Rúgolo de Agrasar and Molina 1997; Renvoize 1998; Rúgolo de Agrasar 2012).

The presence of *Agrostis* species in Peru was checked against the Catalogue of the Flowering Plants and Gymnosperms of Peru (Davidse et al. 1993), additions to this (Vásquez et al. 2002; Ulloa Ulloa et al. 2004; Smith et al. 2005; Rodríguez et al. 2006; Salvador et al. 2008; Linares et al. 2010; Huamantupa et al. 2014; Gonzáles et al. 2011, 2016; Sylvester et al. 2016, 2017), and online checklists for Peru (Plants of the World Online 2020; W3TROPICOS-Peru Checklist 2020). In this treatment, glabrous means without pubescence (in the sense of slender, relatively soft hairs unless otherwise stated). Smooth indicates no prickly-hairs with broad bases and/or hooked or pointed apices (i.e., pubescence can occur on a smooth surface, and a rough or scabrous surface can be glabrous).

Bromidium is likely a synonym of *Agrostis* (Tkach et al. 2020) but *B. anomalum* and *B. tandilense*, which are

stated to occur in Peru (Davidse et al. 1993; Tovar 1993) and have congested inflorescences and florets lacking a palea, have not been included in the identification key. These can be easily differentiated from other *Agrostis* taxa by the lemma apex terminating in four scabrous setae, lemma surface often pilose, lemma with a well-developed geniculate awn inserted in the lower third and surpassing the glumes, calluses pilulose, caryopsis thin, with liquid endosperm (vs lemma apex entire or finely dentate with short teeth at the end of each lateral vein, lemma surface glabrous (rarely with a few hairs in *Agrostis castellana* L.), lemmas muticous, with a short straight awn 0.2–1 mm long, or with a long geniculate and twisted awn to 6+ mm long, inserted basally, medially or in the upper half of the lemma, not surpassing to greatly surpassing the glumes, calluses usually glabrous or with hairs restricted to lateral lines continuous with the basal lemma margins, caryopsis usually rounded, with hardened endosperm in *Agrostis* taxa from Peru).

Results

***Agrostis meyenii* Trin.**, Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6(2, Bot.): 312 (–313). 1841 (Trinius 1841). *Trichodium pusillum* Nees & Meyen, Mém. Acad. Imp. Sci. Saint-Pétersbourg, Sér. 6, Sci. Math., Seconde Pt. Sci. Nat. 6(2, Bot.): 312. 1841, nom. nud. (Trinius 1841).

Figure 1

Type. Chile. Colchagua: Cordilleras ad St. Fernando, sin. col., s.n. (holotype: LE-TRIN-1623.01 (photo SGO); isotype: BAA (BAA00001357 fragm. ex LE-TRIN [image!])).

= *Agrostis canina* fo. *inclusa* Hack., Wiss. Erb. Schwed. Südpolar-Exp. 1901–1903 4 (4): 5. 1906 (Skottsberg 1906). Type: Chile. [Navarinsel, Strandwiesen] Tierra del Fuego, Isla Navarino, 4 Mar 1902, C. Skottsberg s.n. (holotype: S; isotypes: BAB (BAB00000203 [image!]; BAB00000204 [image!]), S, W (W19160035759 [image!])).

= *Agrostis conferta* Nees & Meyen, Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 19(Suppl. 1): 143. 1843 (Nees von Esenbeck 1843), preprint in Gramineae: 11. 1841 (Nees von Esenbeck 1841). Type: Chile. Cordillera de San Fernando, Río Tinguiririca, Feb. 1834, F.J.F. Meyen s.n. (holotype: not located; isotypes: BAA (BAA00000204 [image!]; BAA00000205 [image!]; BAA00000206 [image!])).

= *Agrostis conferta* Nees & Meyen var. *austropatagonica* Pilg., Repert. Spec. Nov. Regni Veg. 12: 304. 1913 (Pilger 1913). Type: Argentina. [Patagonien: Santa Cruz am Belgranosee], 1908, K. Skottsberg s.n. (holotype: B; isotypes: US (US00156395! fragm. ex B).

= *Agrostis falklandica* Hook. f., Fl. Antarct. 2: 373. 1846 (Hooker 1846). *Agrostis canina* L. var. *falklandica* (Hook. f.) Macloskie, Rep. Princeton Univ. Exp. Patagonia, Botany 8(5): 186. 1904 (Macloskie 1904). *Agrostis canina* L. var. *falklandica* (Hook. f.) Hack. ex Skottsb., Kongl. Svenska Vetenskapsakad. Handl. 50(3): 12. 1913, hom. illeg. (Skottsberg 1913). Type: Argentina. Falkland Islands [Islas Malvinas], Antarct. Exped., 1839–1843, J.D. Hooker s.n. (holotype: K; isotypes: BAA fragm., BM (BM000938534 [image!]; BM000938533 [image!]), LE (LE00009318 [image!]), MPU (MPU014113 [image!]), P (P00740575 [image!]), US (US00156424 fragm. ex K [not seen]), W).



Figure 1. *Agrostis meyenii*. **A, B.** Whole plants, different examples. **C.** Inflorescence close-up. **D.** Spikelet, lateral view, with lower glume pulled back to reveal the dorsal surface of the lemma. Images A & C: P.M. Peterson 16207 (US00844234); B & D: P.M. Peterson 13837 (US00844194), courtesy of the US National Herbarium.

New records. PERU—**Ancash** • Prov. Recuay, Cordillera Blanca, 35 km NE of Catac on road towards Chavin de Huantar, [09°38'38.69"S, 077°12'6.72"W], 4140 m alt., large granitic boulders with *Polylepis* and *Buddleja*, 21 Mar. 1997, P.M. Peterson et al. 13837 (US00844194).—**Ayacucho** • Lucanas province, 39 km S of Putajasa, 14°20'12.9"S, 074°21'18.6"W, 4080 m alt., rocky flats with *Deyeuxia* [*Cinnagrostis*], *Festuca* and *Myriocarpa*, 24 Feb. 2002, P.M. Peterson et al. 16207 (US00844234).—**Huánuco** • Huamalies province, 21 km N of Puno on road towards Ponto, 09°24'40.1"S, 076°56'02.2"W, 4450 m alt., open grassy slopes with *Calamagrostis* [*Cinnagrostis*], *Agrostis* and *Poa*, 23 Mar. 2004, P.M. Peterson 17920 (US00844265).

Additional material examined. ARGENTINA—**Chilecito** • Prov. de La Rioja, Sierra de Famatina, camino a La Mejicana, 3500 m alt., 5 Feb. 1927, L.R. Parodi 7952 (US1298751).—**Mendoza** • Malargue, Andes, Rio Salado headwaters, Valle de las Lenas, 36 km NW of Las Lenas on Hwy 222, 65 km NW of Malargue, 2740 m alt., 5 Mar. 2006, P.M. Peterson 19194 (US00093121).—**Neuquen** • Colorado, 1650 m alt., 19 Feb. 1940, Diem 256 (US1910171); Parque Nacional Nahuel Huapi, filo entre Mineo y Tres Marias, 25 Feb. 1953, O. Boelcke 7220 (US2929788) • Rio Negro, Bariloche, Parque Nacional Nahuel Huapi, along trail and slopes to waterfall at Cerro Tronador, 1050 m alt., 29 Jan. 2003, P.M. Peterson 17337 (US00786717).—**Santa Cruz** • Lago Buenos Aires, 77 km SW of Los Antiguos on road towards Paso

Roballos, 1478 m alt., 24 Jan. 2003, P.M. Peterson 17274 (US00787134) • Rio Chico, Estancia Tucu Tucu, 15 km SW of Casa Tucu Tucu, 1015 m alt., 22 Jan. 2003, P.M. Peterson 17222 (US00765622).

CHILE • Los Andes, Potrero Escondido, 3500 m alt., 22 Oct. 1910, O. Boelcke 2445 (US2919945) • Cordillera Santiago, limit nieves perpetuas, Feb. 1854, R. A. Philippi 148 (US556339) • Cordillera de Talca, El Picazo, 26 Jan. 1939, sin col. 6422 (US1912077) • Cordillera de Zulia, El Alto de La Laguna, 26 Jan. 1939, Barros 6421 (US1912076).—Curico • Andes, R.A. Philippi 142 (US556333); Volcan Peteroa, 2500 m alt., Jan. 1925, E. Werdermann 583 (US1498144).—Ñuble • Baños de Chillán, 2100 m alt., 29–31 Jan. 1925, F.W. Pennell 12439 (US1343462) • Baños de Chillán, Aguas Calientes, 2200 m alt., Mar. 1927, E. Werdermann 300 (US1498182) • Termas de Chillan, Valle de Las Nieblas, 2200 m alt., 27 Feb. 1947, A. Pfister 7515 (US2150305).

Description. **Perennial herbs**, laxly to densely tufted and usually with short, delicate, incurved or vertically ascending rhizomes. **Tillers** extravaginal. **Culms** 2–15(–40) cm tall, erect or geniculate at their base, firm, usually with 1 or 2 nodes exerted at flowering. **Leaves** mostly basal, glabrous; *ligules* (0.5–)1–3.5(–5) mm long, shorter in the tillers, truncate to obtuse; *blades* 2–4(–11) cm long, 0.1–0.25 cm wide when opened out, filiform, flat, or conduplicate, fairly lax, smooth or scabrous, apices naviculate. **Inflorescence** paniculate; *panicles* 1–10(–13) cm long, 0.3–0.7 cm wide, linear, sub-spike-like, lateral branches with spikelets almost to the base, usually smooth or lightly scaberulous, sometimes moderately scabrous; *pedicels* 1–4 mm long, usually smooth or lightly scaberulous, sometimes moderately scabrous. **Spikelets** (2–)2.4–3.2(–4.1) mm long; *glumes* lanceolate, subequal with lower glume sometimes slightly longer than upper by up to 0.2 mm, keels usually scabrous in the distal 1/3, lower glume keel sometimes scabrous in the upper 2/3, upper glume sometimes completely smooth, apices acute; *floret* (1/2–)2/3–3/4 the length of the glumes; *calluses* pilose with 2 tufts of short hairs, sometimes glabrous; *lemmas* 1.7–2.6 mm long, glabrous, smooth, 5-veined, apex obtuse, lightly denticulate, muticous, mucronate or exceptionally with a short awn to 1.3 mm long, straight, not twisted, inserted in the middle or upper 1/3 of the dorsal keel, not surpassing the glumes; *paleas* 0.2–0.7 mm long, usually <1/3 the length of the lemma; *anthers* 0.5–0.8(–1.1) mm long. **Caryopses** ca 1.1–1.6 mm long, subcylindrical, light brown; *sulcus* distinct; *hilum* punctiform; *endosperm* solid.

Distribution. Pampa of Argentina and Chile (Rúgolo de Agrasar 2012) and high-elevation puna grasslands of Argentina, Chile (Rúgolo de Agrasar 2012), Bolivia (Renvoize 1998; Jørgensen et al. 2014), and Peru (Fig. 2). In Peru, the species is known from the Cordillera Blanca of Ancash department and Huamalíes province of Huánuco department, as well as further south in the Lucanas province of Ayacucho department (Fig. 2).

Habitat and ecology. Throughout its range, *A. meyenii* tends to grow in humid sites among pampa and high-elevation puna grasslands, such as in damp rock crevices and swamps, or forming lawns near rivers and streams. In Peru, the species is known to grow in open or rocky humid puna grassland alongside species of *Cinnagrostis* Griseb., *Festuca* L., and *Poa* L., as well as growing in *Polylepis* Ruiz & Pav. and *Buddleja* L. woodland.

Phenology. *Agrostis meyenii* appears to flower principally from January to March. In Peru, flowering is known from February to March, which is towards the end of the rainy season.

Similar species. *Agrostis tolucensis* is similar in its overall appearance, usually being tufted and with rhizomes, having similar ligules and filiform or flat leaf blades, and having a condensed spike-like panicle with spikelets of similar size. *Agrostis tolucensis* can usually be differentiated from *A. meyenii* by the presence of an awn inserted in the lower third of the lemma, 2–3.5 mm long, twisted and bent and exerted from the glumes (vs muticous or, if awn present, inserted in the middle or upper third of the lemma, to 1.3 mm long, straight or slightly flexuous in *A. meyenii*). *Agrostis glomerata*, a species described from Peru and here tentatively considered a synonym of *A. tolucensis*, also has muticous lemmas or with a short straight awn inserted in the upper half of the lemma, but can be differentiated from *A. meyenii* by the plants being generally taller, 20–60 cm tall, with flat blades to 5 mm wide, and condensed panicles often >10 cm long that are often interrupted and with the central inflorescence axis notably wider compared to the lateral branches. The pedicels, panicle branches, and sometimes the central inflorescence axis of *A. tolucensis* and *A. glomerata* are also notably scabrous while those of *A. meyenii* are usually smooth or lightly scaberulous (but see below). Some specimens of *A. meyenii* from Argentina (Peterson 19194 (US00093121)) and Chile (Boelcke 2445 (US2919945)) were found to have many spikelets in the inflorescence slightly shorter than normal, to 2 mm long, which could make them be mistaken for *A. breviculmis*, but these had extravaginal branching and folded, filiform, leaf blades.

Identification key differentiating *Agrostis meyenii* from other species of *Agrostis* in Peru with condensed spike-like panicles and reduced or absent paleas <1/2 the length of the lemma (updated descriptions for taxa mentioned can be found in Sylvester et al. 2020b)

1. Lemma muticous, mucronate, or exceptionally with a short straight awn to ca 1.3 mm long, subapical or inserted above the middle of the lemma, weak and falling easily, not or barely exerted from the glumes 2
- 1'. Lemma with a dorsal awn, (1.6–)2–6 mm long, persistent, twisted and bent, exerted from the glumes 4
2. Spikelets 1.5–2.1 mm long (–2.5 mm in Bolivia sensu Renvoize 1998); leaf blades convolute, involute, or strongly conduplicate, usually recurved, rigid,

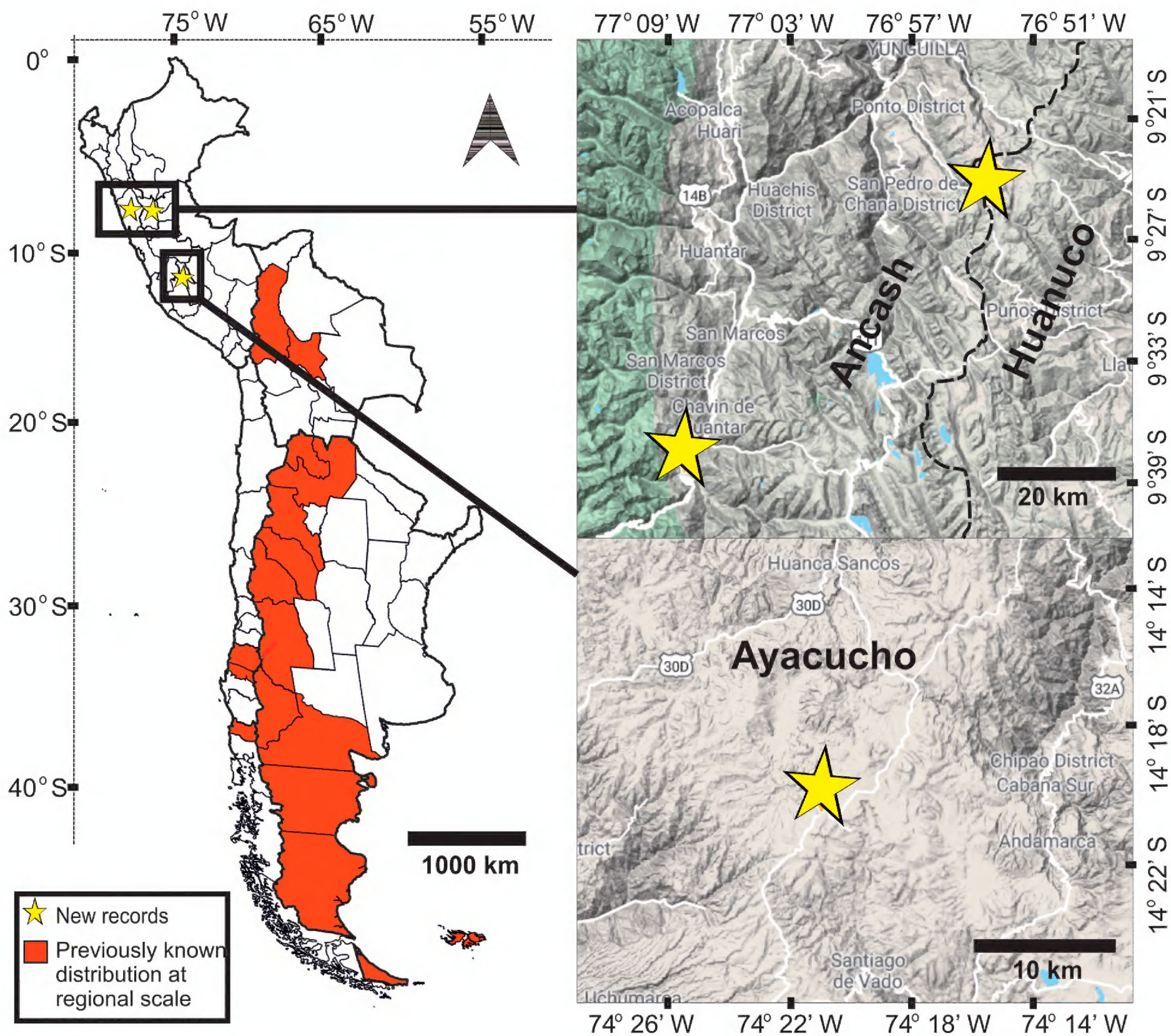


Figure 2. Distribution map of *A. meyenii*, showing the provinces of Argentina, Chile, Bolivia, and Peru, with inserts showing close-up locations of the three collections from Peru (denoted by stars). Shaded areas indicate the provinces of Bolivia, Chile, and Argentina where specimens of *A. meyenii* have been verified at the US herbarium, or which have been recorded in previous literature (Rúgolo de Agrasar and Molina 1997; Renvoize 1998; Rúgolo de Agrasar 2012). Maps taken and modified from MapChart (<https://mapchart.net>) and Google Earth (<https://earth.google.com/>).

- 0.5–2(–3) mm wide when opened out; tillers intravaginal, without cataphylls, not stooling and without notable lateral tending or ascending rhizomes; plants 3–12(–15) cm tall *A. breviculmis* Hitchc.
- 2'. Spikelets 2–4.1 mm long; leaf blades filiform, flat, conduplicate or laxly rolled, straight or flexuous, lax and soft, 1–5 mm wide when opened out (sometimes involute, recurved and/or rigid in basal leaves of *A. toluensis*); tillers extravaginal with cataphyllous shoots present, often with notable lateral tending or ascending rhizomes or stooling; plants 2–35+ cm tall 3
3. Panicle branches, pedicels, and central inflorescence axis usually smooth or very lightly scaberulous; culms 2–15(–40) cm tall; panicles 1–10(–13) cm long, uninterrupted; spikelets 2.2–4.1 mm long; glumes subequal, keels usually scabrous in the distal 1/3, lower glume keel sometimes scabrous throughout or in the upper 2/3, upper glume keel sometimes completely smooth, glume surfaces smooth; lemma 1.7–2.6 mm long *A. meyenii* Trin.
- 3'. Panicle branches, pedicels, and sometimes the central inflorescence axis moderately to densely scabrous; culms (3–)5.5–51(–80) cm tall, often > 15 cm tall; panicles (1–)2–15 cm long, often >10 cm long, interrupted; spikelets 2–3(–3.5) mm long; glumes equal or subequal, keels and often surfaces scabrous at least in the distal half; lemma 1.4–2 mm long *A. toluensis* Kunth (= syn. *Agrostis glomerata* (J. Presl) Kunth)
4. Leaf blades 2–6 mm wide, flat or folded, sometimes somewhat involute towards their apices, subcoriaceous to coriaceous, usually scabrous throughout; flag ligules 4–7 mm long; panicle 1–1.7(–2.5) cm

- wide, with primary lateral branches up to 7 cm long; spikelets (3–)3.5–4.2 mm long; floret usually ca ½ the length of the glumes, rarely slightly longer *A. foliata* Hook.f.
- 4'. Leaf blades 1–3(–5) mm wide, filiform, flat or folded, sometimes involute or convolute, lax to firm but not (sub-)coriaceous, scabrous in the margin and veins or smooth throughout; flag ligules 2–4(–6.2) mm long; panicle 0.1–1.5 cm wide, with primary lateral branches 0.5–1.5 cm long; spikelets 2–3(–3.6) mm long; floret ½–⅔(–¾) the length of the glumes *A. tolucensis* Kunth

Discussion

Agrostis meyenii is here presented as a new country record for Peru and is not mentioned in any of the checklists (Davidse et al. 1993; Ulloa Ulloa et al. 2004; Rodríguez et al. 2006; Plants of the World Online 2020; W3TROPICOS-Peru Checklist 2020). The species was previously known from high-elevation puna grassland and pampa of Argentina, Chile (Rúgolo de Agrasar 2012), and Bolivia (Renvoize 1998; Jørgensen et al. 2014) (Fig. 2). In Peru, *A. meyenii* is found in dry high-Andean puna grassland as far north as the Huamalíes province of Huánuco department, being also found close by in the Cordillera Blanca of Ancash department (Fig. 2). These collections are ca 1200 km to the northwest of the previously northernmost collection in Murillo, district of La Paz, Bolivia (Renvoize 1998; Jørgensen et al. 2014). The species is also found further south in Peru, in the Lucanas province of Ayacucho department, and it is likely to extend across the puna grassland biome of the central Andes, but has so far been unrecorded.

Agrostis meyenii has also been mentioned in a key for a selection of Ecuadorian and Colombian *Agrostis* species with contracted inflorescence at maturity with more or less appressed branches (Palacio et al. 2020), although specific reference to the species being a new country record for either Ecuador or Colombia was not stated. However, while at the US National Herbarium we have not encountered specimens of *A. meyenii* from Ecuador or Colombia, with all specimens at the US determined as *A. meyenii* being redetermined as *A. glomerata* (J. Presl) Kunth, here considered a synonym of *A. tolucensis* (see “Similar species” above). Nevertheless, the apparent affinity of *A. meyenii* for humid sites within the pampa and puna makes it plausible that it may occur in humid Jalca and páramo grasslands farther north. This notion is further supported by the large ecological amplitude exhibited by the species, with it being found from sea level in the Tierra Del Fuego (Rúgolo de Agrasar 2012) to over 4450 m altitude in high-Andean dry puna. The species was previously known to 4200 m altitude (Rúgolo de Agrasar 2012) with the Peruvian collection from Huánuco, *P.M. Peterson 17920* (US00844265), marking the highest elevation recorded for the species.

Agrostis meyenii also exhibits a large amount of

phenotypic variability that requires further study. While Rúgolo de Agrasar (2012) stated that the panicle branches and pedicels in *A. meyenii* are completely smooth or exceptionally scaberulous, specimens from Argentina (e.g. *Boelcke 7220* (US2929788), *Peterson 17222* (US00765622), *17274* (US00787134), *19194* (US00093121)), and Chile (*Boelcke 2445* (US2919945), *Pfister 7515* (US2150305)) bore most characteristics of *A. meyenii* but had moderately scabrous panicle branches and pedicels. Further study is needed to clarify the variation in this character and whether these bear more affinity to *A. tolucensis*. Panicle branches and pedicels of specimens studied from Peru were usually smooth or very lightly scaberulous. *Peterson 13837* (US00844194) exhibits slight differences from the current circumscription of the species, being found 35–40 cm tall, and with culm blades to 9.5 cm long and panicles 8.5–13 cm long. The spikelets of this specimen also differed slightly, with the lower glume keels being scabrous in the upper two-thirds, while the upper glume was often smooth. *Peterson 17920* (US00844265) also had particularly long leaf blades to 11 cm long. Specimen *Peterson 16207* (US00844234) is typical of *A. meyenii* from austral South America.

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Authors' Contributions

SPS designed the study, reviewed herbarium specimens, made the identifications, and wrote the manuscript; MDVPS contributed to writing the manuscript and preparing the figures.

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